Sigma Notation (unit 5 Day 10)

* use the greek letter sigma $\sum$ to represent a sum.

$$\sum_{\text{start}}^{\text{stop}} \text{explicit equation}$$

(ex) $\sum_{k=1}^{6} 2k-1$

Rewrite as series: $1+3+5+7+9+11$

Evaluate: $\boxed{36}$

(ex) $\sum_{k=1}^{3} 4 \cdot 3^{k-1} = 4 + 12 + 36$

$= (52)$

(ex) $\sum_{k=1}^{6} -2^{k-1} = -1 + -2 + -4 + -8 + -16 + -32$

$= \boxed{-63}$

(ex) $1+3+5+7$ → Rewrite using sigma notation:

Arithmetic!

$a_n = a_1 + d(n-1)$

$= 1 + 2(n-1)$

$= 1 + 2n - 2$

$= 2n - 1$

$$\sum_{k=1}^{4} 2k-1$$

(ex) $3 + 9 + 27 + 81 + 243$

Rewrite using sigma notation:

$$\sum_{K=1}^{5} 3(3)^{K-1}$$

$a_n = a_1(r)^{n-1}$

$= 3(3)^{n-1}$

Infinite Series

* Always check to see if converges or diverges (no sum)

(ex) $\sum_{K=1}^{\infty} -4^{K-1} = -1 + -4 + -16 + \ldots$

$r = 4$

$|4| > 1 \rightarrow$ diverges

no sum

(ex) $\sum_{K=1}^{\infty} 4.2(.2)^{K-1} = 4.2 + .84 + \ldots$

$|.2| < 1$ so converges

$r = \frac{.84}{4.2} = .2$

$$S_\infty = \frac{4.2}{1-.2} = \boxed{5.25}$$

(ex) $\sum_{K=1}^{\infty} \frac{7}{6}\left(-\frac{1}{4}\right)^{K-1} = \frac{7}{6} + \frac{-\frac{7}{24}}{} + \ldots$

$|-\frac{1}{4}| < 1$ so converges

$r = -\frac{1}{4}$

$$S_\infty = \frac{\frac{7}{6}}{1--\frac{1}{4}} = \boxed{\frac{14}{15}}$$